

SALTWATCH – A COMMUNITY ENGAGEMENT TOOL AND A WATER QUALITY MONITORING EVENT

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BACKGROUND

Saltwatch has been run in South Australia since 2001 as an annual environmental monitoring event in May. The concept of Saltwatch began in Victoria in 1987 (Department of Natural Resources and Environment 1997) and is one of Australia's longest running community-monitoring events.

A pilot study marked the debut of Saltwatch in South Australia in 2001. The aim was to gauge the level of community interest and determine the feasibility of the program becoming an annual state-wide event. In 2001 the main focus of the program was salinity in the River Murray (EPA 2003). However, the program has expanded over the last four years to include more participants and sites, community groups and schools in other regions across the state.

In the past the Waterwatch South Australia State Office coordinated the Saltwatch program through the Community Education and Monitoring section of the Environment Protection Authority (EPA). In 2004, the EPA relinquished State Coordination of Waterwatch SA, but continued to provide scientific support and promotion for community water monitoring activities for the Waterwatch SA program.

Between 2001 and 2004 the Saltwatch program has been promoted as a community engagement tool to raise awareness regarding salinity issues. However, at times, it has also been promoted as a Quality Control (QC) event for the collection of salinity monitoring data across the state. The promotion of both these aims has resulted in some confusion regarding the overall direction of the Saltwatch program. However, in a recent participant evaluation of Saltwatch 2004, participants indicated that Saltwatch could be both an awareness raising tool and a QC event, proving the aims are not necessarily mutually exclusive.

ONE EVENT - TWO AIMS

Raising awareness of salinity issues

A key aim for setting up Saltwatch monitoring in South Australia was to enable participants to learn about the effects of salinity on water quality in their catchments. This is accomplished by participants collecting samples of local water to determine salt concentration by using an electrical conductivity (EC) meter and comparing their salinity results with known ranges for the local region to gauge the health of the water at the sample site.

Salinity is an important indicator of water health because many aquatic species only survive within certain salinity ranges. Changes in salt levels may result in changes to the abundance and diversity of aquatic plants and animals in a waterway. The health of catchments and changes in salinity levels can be monitored by regular EC readings and noting changes in aquatic species present in waterways, as some species cannot tolerate high salinity levels.

Vegetation removal or poor irrigation practices can result in an increased volume of water infiltrating the soil, causing the water table to rise. As evaporation and capillary action draws the water back towards the soil surface, it carries with it dissolved salts from the soil. Then as the water evaporates, high concentrations of salt are deposited on the soil surface. This salt may eventually find its way into waterways, which in turn causes stress for salt intolerant flora and fauna.

Salinity data is important information for local communities to collect as elevated salinity levels affect not only aquatic ecosystems, but can also have adverse impacts on human activities relating to irrigation of crops, provision of domestic water supplies and watering of stock.

Raising awareness about the causes and impacts of changing salinity levels is seen as an important education focus in South Australia. Human activity such as land clearance, extraction of groundwater, irrigation and diversion of water from wetlands and waterways has altered salinity levels across the state and has resulted in some areas experiencing severe salinity problems such as dry-land salinity (e.g. Upper South East) and saline intrusions into groundwater and surface water bodies (e.g. River Murray Basin). Through raising public awareness of salinity issues and increasing community understanding of the causes and impacts of salinity the local community are better placed to be able to support and take action to address salinity problems.

Collecting good quality data

The secondary aim of Saltwatch has been to encourage community collection of salinity data across South Australian waterways. Standard Quality Assurance and Quality Control (QA/QC) procedures have been established for the event to ensure consistent data quality. Participants test two QC solutions or 'mystery solutions' before taking their site samples. The accuracy of their readings for QC solutions determines if the site data will be accepted for adding to the Saltwatch database.

A very high level of data acceptance has been achieved for the salinity data in South Australia. The majority of data (greater than 95% of results) has been accepted within a 5% acceptance range and a remaining portion (less than 5% of overall results) within a 10 % acceptance range. On a few occasions data has been within a 20 % range, for Saltwatch data from 2001 to 2004, but this has been for less than 1 percent of the overall results.

Comparisons of Saltwatch data from 2001 to 2004 indicate that salinity readings are highly variable across the state. EC readings range from predominately low to medium levels (less than 2000 EC units or u/Scm) in the higher rainfall catchment of the Mount Lofty Ranges, to predominately high levels (greater than 2000 EC units) in the upper South East and Mid-North (Broughton and Wakefield catchments).

The ongoing success of Saltwatch relies on the ability of the program to:

- engage the community in the event
- meet community expectations for the event
- collect good quality or consistent salinity data
- link the data to other environmental databases.

A REVIEW OF SALTWATCH 2001 TO 2004

Currently a program evaluation of Saltwatch from 2001 to 2004 is underway. The key areas being considered in this evaluation include:

- participation rates
- participant satisfaction with Saltwatch
- data accuracy and interpretation
- potential uses for Saltwatch data.

Participation in Saltwatch

In Saltwatch 2004, 83 groups monitored salinity levels in their local waterways, and 1605 individuals monitored 170 sites across the state. Table 1 lists the site and group details for the regional catchment areas monitored from Saltwatch 2001 to 2004. From comparisons of the total groups involved from 2001 to 2004 (Table 1) it is evident that the Saltwatch program has been able to increase the level of participation in the first three years. Then in 2004 despite reduced levels of participation in some areas, the overall level of participation was maintained through new groups and regions participating in Saltwatch.

From 2001 to 2003 Saltwatch participants were from the 7 regional Waterwatch programs as indicated in Table 1. However, in 2004 we welcomed new regional participants from non-Waterwatch regions including Rapid Bay Primary School on Fleurieu Peninsula, and Wudinna and Tumby Bay Area Schools on Eyre Peninsula.

Table 1: State and regional site and group information, Saltwatch 2001 to 2004

Regional Catchment Area	Community Groups 2004	Schools Groups 2004	Total Groups 2001-2004				No. of People 2004	No. of Sites 2004
			01	02	03	04		
Patalawonga & Torrens Catchments	9	12	2	7	19	21	358	35
Northern Adelaide & Barossa Catchments	4	6	5	11	10	10	155	12
Onkaparinga Catchment	7	7	3	10	18	14	114	33
Broughton/Wakefield Catchment	6	5	18	21	16	11	251	26
South East	0	3	5	3	12	3	77	19
Riverland	1	5	14	6	7	6	98	10
Lower Murray	7	8	8	10	16	15	528	31
Southern Fleurieu	0	1	0	0	0	1	15	1
Eyre Peninsula	0	2	0	0	0	2	9	3
State Totals	34	49	55	68	83	83	1605	170

From 2001 to 2004 Saltwatch has broadened to become a state-wide community water monitoring event with increasing levels of participation.

The overall aim in terms of participation is that groups continue to monitor the same sites each year in order to build up a consistent database across the state, as well as encouraging new groups to monitor where there are gaps in data. In a recent survey of participants in Saltwatch, 89 percent of respondents indicated that they had participated in Saltwatch for at least two years. The same participants have monitored many sites in the Broughton Wakefield and the River Murray Waterwatch regions for three or four consecutive years. In results from the participant evaluation of Saltwatch 2004, 95 percent of respondents indicated that they

aim to participate in Saltwatch in 2005. This data is demonstrating that groups are starting to realise the importance of monitoring the same sites each year.

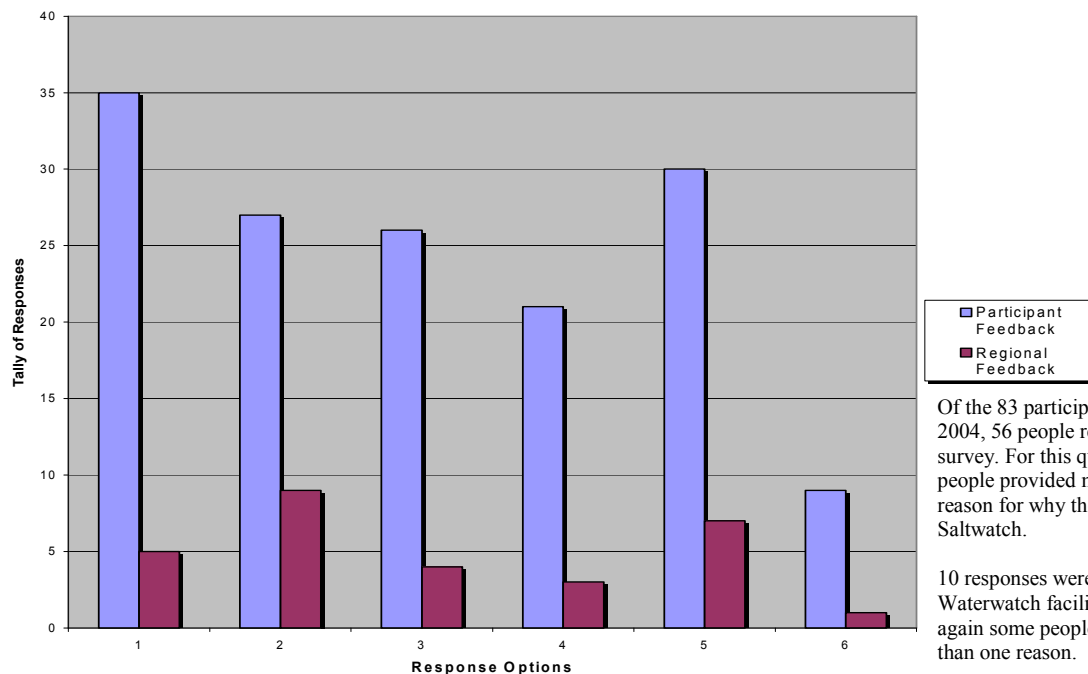
Participant satisfaction with Saltwatch

To evaluate participant satisfaction with Saltwatch a survey was undertaken of 2004 participants and regional Waterwatch facilitators (program staff) to determine why people get involved in Saltwatch and to assess their level of satisfaction with the program.

It is interesting to note the difference between the responses from the participants and the Waterwatch facilitators when asked why people participate in Saltwatch. The response rate to the survey from participants was 67 percent (56 surveys returned out of 83), and the response rate from Waterwatch facilitators was 77 percent (10 surveys out of 13).

The key responses (Figure 1) for why people have participated in Saltwatch included:

1. as a quality control requirement for 'advanced' or standard' level monitoring (participants 24%, Waterwatch facilitators 17%)
2. for educational reasons to raise awareness of salinity issues (participants 18%, Waterwatch facilitators 31%)
3. to have data included in the EPA Saltwatch database (participants 18%, Waterwatch facilitators 14%)
4. for the monitoring experience (participants 14%, Waterwatch facilitators 10%)
5. to be part of a state wide monitoring event or for the monitoring experience (participants 20%, Waterwatch facilitators 24%)
6. other eg. for specific projects (participants 6%, Waterwatch facilitators 4%)



Of the 83 participants in Saltwatch 2004, 56 people responded to the survey. For this question some people provided more than one reason for why they participate in Saltwatch.

10 responses were received from the Waterwatch facilitator network, and again some people provided more than one reason.

(Percentages listed above calculated for a response to a question from the total number of responses from participants or Waterwatch facilitators separately)

Figure 1: Graph of participant and regional Waterwatch responses to why people participate in Saltwatch

As indicated in Figure 1 the majority of Saltwatch participants indicated that they participated in Saltwatch 2004 as a Quality Control (QC) requirement for the 'advanced' and 'standard' level monitoring for the implementation of the Data Categories for Community Water Monitoring (see paper B by L. McDowell for National Waterwatch Conference 2005). However, for the purpose of this evaluation if you remove this response in relation to the Pilot Data Categories Project implemented in 2004, then there is a closer correlation between the responses from participants and regional programs.

The educational and awareness raising aspect of Saltwatch is a key feature to the program and a primary or secondary reason that many people become involved in Saltwatch and think it is worthwhile. Overall both regional Waterwatch programs and participants strongly believed that participating in Saltwatch was an effective way to raise awareness of water quality issues in their school and/ or community. Other than participating for education reasons a high number of both participants and Waterwatch facilitators indicated that being part of a state wide monitoring event was also a key reason for participating in Saltwatch.

Most participants who responded indicated that they had no difficulties with the process of being involved with Saltwatch and sending in their data, whereas the Waterwatch facilitators indicated a greater level of dissatisfaction with the Saltwatch implementation process. This may be due to some of the participants who had difficulties with the process of Saltwatch not responding to the evaluation, but informing their regional Waterwatch program of their concerns. Therefore, further consideration should be given to addressing the issues identified by the regional Waterwatch programs, eg. too short a time for the registration process for Saltwatch, or not having data sheets available on the web that people can download if they lose the sheet that has been sent to them. Some of these issues with the administration process of Saltwatch have been picked up in a second survey that was done to investigate the feasibility of online options for Saltwatch in South Australia.

In terms of the level of satisfaction with the data feedback provided to Saltwatch participants, participants who responded to the survey indicated that they were happy with the type, style and quantity of the feedback that had been provided in the past, whereas regional Waterwatch facilitators indicated a greater level of dissatisfaction with the feedback that was provided to Saltwatch participants. Again this may reflect the fact that the participants that did have issues and concerns may have spoken directly with their regional Waterwatch program, but did not complete the evaluation on Saltwatch.

Questions relating to the type of feedback people are looking for was included in the second survey relating to gearing Saltwatch towards an online process. In summary participants indicated that they want feedback to include:

- state and regional maps of salinity levels
- graphs of salinity values for different catchments
- data tables of the salinity levels
- basic information on interpretation of salinity levels

Overall participant feedback indicated a very high level of satisfaction with the Saltwatch program, but regional Waterwatch facilitators had some concerns about the aims of Saltwatch, the processes involved in the administration of Saltwatch and the type of feedback provided. With continued consultation with the regional Waterwatch facilitators these issues should be able to be addressed in order to clearly define the aims of Saltwatch, improve the efficiency of conducting Saltwatch and to provide relevant feedback to participants.

Saltwatch data

Salinity data collected by participants through Saltwatch has had a very high level of data accuracy, as greater than 95% of results for 2001 to 2004 have been accepted within a 5% acceptance range and a remaining portion (less than 5% of overall results) within a 10% acceptance range. For example in 2002, sixty-six groups (97% of the total participants) had their data accepted as part of Saltwatch 2002 within a 5 percent confidence interval. This high level of achievement has continued to be met each year through the South Australian Saltwatch program.

Saltwatch feedback has been provided to participants in the form of letters, regional and state maps, and written reports. The state maps (to be distributed at conference) have indicated the range of salinity readings for Saltwatch and the spread of sites across the state. However, as indicated in the regional feedback maps (to be distributed at conference) many sites that have been monitored in the past were not monitored in 2004. If sites are not monitored consistently in consecutive years it makes meaningful data interpretation much more difficult.

In 2004, the highest salinity levels were recorded in the Broughton and Wakefield catchments and in the Onkaparinga catchment. Lower salinity levels were recorded in some of the flowing waterways from the higher rainfall region of the Mount Lofty Ranges (e.g. Gawler, Little Para, Dry Creek, Torrens and Patawalonga catchments). For 2004 most salinity readings from the River Murray and South East were less than 2000 EC. A summary of state data from 2001 to 2004 is presented in Table 2.

The pattern of salinity ranges monitored in Saltwatch 2004 generally match the data obtained from previous years (Table 2) and are influenced by the natural history of each region including geology, soil type, rainfall and recent land management practices. However, more detailed regional interpretation of salinity data should be undertaken on a regional scale as has been done for the Saltwatch 2004 feedback (copies will be provided at the conference).

Table 2: Summary of Salinity Data by Regional Catchment Area, Saltwatch 2001 to 2004

Years	2001		2002		2003		2004	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean
Patalawonga & Torrens Catchments	1 site accepted 1600	1600	450-2666	1356	260-6420	1405	170-39000	2097
Northern Adelaide & Barossa Catchments	1100-4900	2683	200-1900	959	140-2100	2133	190-1280	2907
Onkaparinga Catchment	120-5530	1427	320-5700	2314	210-5420	5455	120-5540	1966
Broughton/ & Wakefield Catchments	10-19500	7006	233-26700	7945	780-10120	4916	2357-20000	7189
South East	700-6600	1716	720-5260	2458	400-11840	2585	700-20000	3385
Riverland	300-17000	2775	530-14200	3290	180-6000	727	210- 6970	1970
Lower Murray	160-16580	3166	700-67770	8361	320-20000	5035	365-77,300	5143
Southern Fleurieu	-	-	-	-	-	-	2880-3250	3065
Eyre Peninsula	-	-	-	-	-	-	1 site 40	40

Note: '-' indicates site not monitored. Salinity is measured in EC units or u/Scm

Interpretation of the Saltwatch data is best done at the regional scale because of the huge natural variations in salinity ranges across different catchments in South Australia. However, the guide, for 'What does your salinity level mean?' (Box 1) is a basic indication of salinity

levels in South Australia. This information, or similar information is used in regional and state feedback on salinity monitoring, which is undertaken as part of Waterwatch and Saltwatch.

Box 1: Example of a salinity interpretation guide used in South Australia for Saltwatch and Waterwatch

<i>What does your salinity level mean?</i>		
<i>EC $\mu S/cm$</i>		
0 – 730	Very Low	Range for rain water and tap water
740 – 2,700	Low	Healthy level for most aquatic invertebrates and plants
2,710 – 5,300	Medium	Maximum drinkable level for livestock
5,310 – 10,000	High	Some freshwater animals and plants will not survive
10,000 – 46,000	Very High	Many freshwater animals and plants will not survive, but some specialised species can tolerate such salinity levels e.g. in estuarine environments or natural springs
46,000 – 70,000	Extreme	Same as seawater or hypersaline

The next step with Saltwatch is to consider how the information can be linked with other environmental data. An example is the planned use of the Saltwatch data in the Bureau of Rural Sciences (BRS) salinity-mapping project for the Mount Lofty Ranges. In a report that the EPA funded on the “Perceptions of Waterwatch Data – Navigating the road to the Scientific Potential of the Waterwatch Data Chain” (Bergin 2002), data users indicated that, subject to data being of a known data quality, community data can be useful indicator data to gain an overall impression of what is happening in a catchment or regional area. In South Australia community collected data has a much greater spatial coverage compared to data collected by government agencies and scientific organisations, and therefore could be quite valuable in providing a more complete picture of salinity and water quality data across the state.

FUTURE DIRECTIONS FOR SALTWATCH IN SOUTH AUSTRALIA

The EPA currently recognises the importance of community engagement programs, such as Saltwatch, as tools for awareness raising about broader water quality issues relating to eutrophication of catchments, nutrients and maintenance of environmental values. The QC component of Saltwatch is not the primary focus of the event, but does allow data that is collected to have associated levels of data confidence so it can be more confidently used in appropriate environmental reporting.

For the development of a comprehensive database on Saltwatch, participants need to continue to monitor sites that have been monitored in the past, in order to build a good temporal coverage of the data. To improve the spatial coverage of the data, new groups and sites may have to be selected strategically to fill gaps in the coverage. The outcome of such a database will be that more meaningful comparisons of data will be able to be made between sites, regions and years. Through a comprehensive database linked to a Geographic Information System (GIS), Saltwatch data could be linked to regional environmental data and potentially feed into State of Environment Reporting and regional monitoring and evaluation for integrated natural resource management (INRM) processes.

However, the QA/QC focus should be seen in the context of the key aim, which is raising awareness about salinity issues and engaging people in monitoring salinity levels across the state. Feedback from Waterwatch facilitators and participants in Saltwatch has indicated that the QA/QC focus of Saltwatch should not be at the expense of the education and awareness aim. Instead the QA/QC component should be complementary to the key aim in ensuring that

good quality data is collected and then used to inform both participants and the broader community about water quality issues in South Australia.

An option under consideration for 2005 is to run Saltwatch as an online event. The intention is that people can register, enter data and seek regional and state feedback information online via the Waterwatch SA website. However, a survey of participants indicated that although this aim may be worthwhile in the longer term as more people gain access to the internet, the vast majority of participants, including school teachers and community groups, still prefer to correspond via mail and fax.

The establishment of an online option for Saltwatch will need further investigation, but at a first stage more information on Saltwatch will be available on the Waterwatch SA website so people can download Saltwatch registration forms, data entry forms and feedback.

For further information on Saltwatch refer to www.sa.waterwatch.org.au

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